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THE MARINE CORPS TRAINING EXPERIENCE: CORRELATES OF PLATOON ATTRITION RATE DIFFERENCES

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THE MARINE CORPS ~~BASIC~~ TRAINING EXPERIENCE:
Correlates of Platoon Attrition Rate Differences*

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SUMMARY

Novaco, Sarason, Cook, and Cunningham (1979) reported wide variations in platoon attrition rates during Marine Corps basic training and suggested that organizational factors determine platoon attrition rates. One implication of this hypothesis would be that studying high and low attrition platoons could be a way to isolate organizational practices that influence attrition. The present report replicated the findings leading to the Novaco, et al. (1979) hypothesis and compared the leadership style and stress levels of high and low attrition platoons.

Method. Two recruit cohorts were studied (Cohort 1, n = 2360; Cohort 2, n = 2648). Basic Training (BT) Attrition data were obtained from computerized records kept at the Marine Corps Recruit Depot, San Diego. Additional data collected as part of a larger program investigating stress effects in basic training included: demographic and social background measures, personality measures (Cohort 2 only), perceptions of leadership and stress in basic training (Cohort 1 only), and academic performance, physical fitness, and rifle qualification scores routinely used in the training program as performance measures. Fleet Marine Force (FMF) attrition and promotion data were obtained from Headquarters, Marine Corps.

Platoons were classified into high, medium, and low attrition categories based on the percentage of recruits who initiated their training with the platoon, but attrited prior to graduating. Analyses of variance and loglinear analyses related platoon attrition level to the measures mentioned above.

Results. (1) Platoon attrition levels varied widely. (2) Novaco, et al.'s (1979) finding that the behavioral attrition/medical-erroneous enlistment attrition ratio was highest in the high attrition platoons did not replicate. (3) Platoon attrition level was substantially independent of (a) recruit characteristics, (b) BT performance, and (c) FMF success. (4) Recruits in high and low attrition platoons reported similar stress and leadership experiences. (5) There was no evidence that the attrition rates for the three BT battalions differed reliably.

Implications. Substantial variation in platoon attrition rates is a consistent characteristic of recruit training. At present, no empirically supported explanation of these differences is available. A better understanding of the phe-

nomenon might be achieved by several means, including considering additional indicators of recruit quality or organizational dynamics or using a different basis for defining platoon attrition level (e.g., basing the classification only on behavioral attrition rather than total attrition). Extensions of the research should emphasize attempts to identify possible organizational determinants of platoon attrition level because these determinants probably can be controlled more readily by the organization than can recruit quality.

TABLE OF CONTENTS

Summary.....	1
Table of Contents.....	iii
Acknowledgments.....	iv
Introduction.....	1
Method	
Sample.....	2
Study Design.....	3
Attrition Classification.....	3
Platoon Attrition Level.....	4
Analysis Procedures.....	5
Results and Discussion	
Recruit Quality.....	6
Organizational Dynamics.....	6
Selective Attrition.....	7
Hypothesis 1: Behavioral to Medical/Erroneous	
Attrition Rate.....	7
Hypothesis 2: BT Performance.....	8
Hypothesis 3: FMF Success.....	9
Hypothesis 4: Recruit Characteristics.....	10
Stress and Leadership.....	10
Battalion Attrition Rates.....	10
Conclusions.....	11
References.....	12

APPENDICES

Appendix A: Definition of Variables.....	A-1
Social and Demographic Characteristics.....	A-2
Personality Measures.....	A-3
Perceptions of Training.....	A-5
Training Performance.....	A-8
Aptitude Scores.....	A-8
Appendix B: Analysis Procedures.....	B-1



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Availability Codes	
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A-1	

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INTRODUCTION

Recruit attrition during basic training (hereafter, BT) is a significant military concern. Because a recruit's social and psychological attributes are imprecise predictors of attrition, even when a wide range of theoretically and empirically appropriate predictors are combined in a single study (1), factors other than individual differences must be considered to fully understand BT attrition. Novaco, Sarason, Cook, and Cunningham (2) presented data suggesting that organizational factors are important to BT attrition. Platoon attrition rates ranged from 0% to 28% even though recruits in high and low attrition platoons had similar social backgrounds and personality profiles. Also, high attrition platoons did not perform better than low attrition platoons as would be expected if high attrition platoons selectively attrited a larger than average proportion of marginal performers. One difference between high and low attrition platoons that did emerge was a higher ratio of behavioral attrites to medical/erroneous attrites among high attrition platoons. Thus, the increased attrition for high attrition platoons was concentrated in discharge categories for which attrition decisions were, at least partly, at the discretion of training personnel. The combined findings led to the hypothesis that organizational dynamics are a cause of platoon attrition rate differences (2, p. 41).

Novaco, et al.'s (2) organizational dynamics hypothesis has important practical implications. If platoon attrition level differences are due to organizational factors, those factors should be identifiable through comparison of high and low attrition platoons. Such a comparison therefore would be an effective first step toward reducing attrition by changing organizational characteristics that affect this outcome. Because of its importance, the organizational dynamics hypothesis is the primary concern of this report.

Novaco, et al. (2) provided primarily indirect, inferential evidence to support the organizational dynamics hypothesis. Also, their observations may have been influenced by factors unique to their particular recruit cohort. Thus, the initial findings must be replicated and the hypothesis subjected to more extensive testing. These needs led to the examination of two primary questions in this report:

- (a) Can platoon attrition rate differences be explained by platoon differences in recruit quality?

- (b) Do the organizational dynamics of high and low attrition platoons differ as indicated by selective attrition of particular types of recruits and/or differences in stress levels or leadership style?

A negative answer to the first question would replicate one key finding of Novaco, et al. (2). A positive finding for either possibility suggested in the second question would support Novaco, et al.'s (2) organizational factors hypothesis.

METHOD

Sample

Two cohorts of recruits undergoing basic training at Marine Corps Recruit Depot, San Diego, CA, were studied. Cohort 1 included 2360 recruits from 40 platoons graduated from BT during February and March of 1980. Cohort 2 included 2648 recruits from 44 platoons graduated from BT during July and August, 1980. Basic descriptive statistics for the two cohorts are given in Table 1.

TABLE 1
DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

MEASURE	COHORT 1		COHORT 2	
AGE (years)	19.39	(2.07)	18.94	(1.98)
RACE				
Caucasian	73.77%		68.69%	
Other	25.00%		28.82%	
EDUCATION (years)	11.50	(0.93)	11.71	(1.04)
GCT	103.20	(16.16)	104.10	(16.60)
HIGH SCHOOL DIPLOMA				
No	42.88%		36.10%	
Yes	55.93%		63.00%	
MARITAL STATUS				
Single	92.33%		93.35%	
Other	6.44%		5.89%	

NOTE: The means (with standard deviations in parentheses) are given for age, education and GCT. Percentages do not sum to 100 because of missing data.

Study Design. The study designs for the two cohorts differed slightly because the data on the two cohorts originally were collected to meet different research needs (see Table 2).

TABLE 2
OUTLINE OF THE STUDY DESIGNS

MEASURES OF	NUMBER	COHORT 1	COHORT 2
Social Background	19	Yes	Yes
Personality	31	No	Yes
Armed Services Vocational Aptitude Board Scores and GCT	17	Yes	Yes
Organizational Stress and Leadership	16	Yes	No
Performance	6	Yes	Yes
Health	4	Yes	Yes
FMT Attrition and Advancement	1	Yes	Yes

NOTE: Definitions of the categories and the variables in each are given in Appendix A.

Attrition Classification. Official separation codes obtained from Marine Corps Recruit Depot, San Diego, records were used to classify recruits as: (1) Graduates, i.e., recruits who successfully completed BT. (2) Medical Attrites, i.e., recruits discharged prior to completion of BT for medical problems. (3) Behavioral Attrites, i.e., recruits discharged as training failures, for aptitude and ability problems, for misconduct, for lack of motivation, behavioral problems, or fraudulent enlistment.

Erroneous enlistment was treated as behavioral attrition in our analyses except when comparing attrition patterns across cohorts (p. 4). Novaco, et al. (2) classified erroneous enlistments with medical discharges, but did not give a specific reason for this. The key factor distinguishing erroneous and fraudulent attrition frequently is whether the recruit tried to conceal a background of delinquency or asked for a waiver which was denied. Because discussions with

Marine Corps personnel who administer the attrition process suggested that waiver denial sometimes results from an inaccurate report of past police record, it is difficult to make a clear distinction between the two discharge categories. The Novaco, et al. (2) classification was used in the comparison of cohort attrition patterns to minimize the possibility of differences between our findings and their earlier findings as a result of simple procedural differences. In the other analyses, our classification schema has been used to maintain continuity with earlier reports. The small number of erroneous enlistment attrites ($n = 9$ for Cohort 1; $n = 10$ for Cohort 2) makes it unlikely that this classification decision is a significant factor in our findings.

Platoon Attrition Level. Platoons were classified as low, medium, or high attrition as follows:

(a) An initial platoon roster was established by identifying recruits who began their basic training with each platoon in our cohorts.

(b) If the initial roster included fewer than 35 men, the platoon was excluded from analysis. When fewer than 35 men were listed as beginning training with the platoon it seemed likely that there was missing data or that many men in the platoon had initially started training with some other platoon, but had to begin again because of difficulties encountered in their initial training experiences. In either case, a platoon attrition rate based on those recruits who were listed as beginning their training with the platoon could be misleading because these recruits might not be representative of the platoon as a whole.

(c) The number of recruits on the initial roster who attrited prior to completing BT was established. No distinction was made with regard to reason for attrition because Novaco, et al. (2) did not distinguish different types of attrition when establishing platoon attrition level classifications.

(d) The platoon attrition rate was determined by dividing the number of recruits who attrited by the total number in the initial platoon roster.

(e) Platoons were rank ordered by attrition rate within each cohort. The platoon attrition rates were examined to see whether a substantial range occurred. In Cohort 1, the range was 2% to 31%; in Cohort 2, the range was 5% to 24%. These ranges were wide enough to provide reasonable replication of the Novaco, et al. (2) values of 0% to 28%.

(f) A low-medium-high classification was established by selecting cutoff points based on two criteria: (i) The points had to closely approximate the cutoffs used by Novaco, et al. (2). (ii) Two adjacent percentages in the rank ordering differed by more than 0.8%.

(g) Overall patterns of attrition were then compared (3). Except for comparisons involving an unusually high behavioral attrition rate in Cohort 1 high attrition platoons, our cohorts did not differ significantly (see Table 3). Also, the attrition pattern for both cohorts was similar to that reported by Novaco, et al. (2). The minor difference represented by the Cohort 1 deviation from the common pattern did not appear to affect the results obtained in our subsequent analyses.

BASIC TRAINING OUTCOME AS A FUNCTION OF PLATOON ATTRITION LEVEL

COHORT	ATTRITION	BEHAVIORAL	MEDICAL ERRONEOUS	GRADUATE
1	Low	37	22	687
		5.0%	2.9%	92.1%
	Medium	37	41	555
		5.8%	6.5%	87.7%
	High	147	66	739
		15.4%	6.9%	77.6%
	Total	221	129	1981
		9.5% ^{c,d}	5.5%	85.0% ^c
2	Low	50	37	1009
		4.6%	3.4%	92.1%
	Medium	51	45	672
		6.6%	5.9%	87.5%
	High	58	62	611
		7.9% ^d	8.5%	83.6% ^b
	Total	159	144	2292
		6.1% ^c	5.5%	88.3% ^c
N-St	Low	5	9	186
		2.5%	4.5%	93.0%
	Medium	12	10	148
		7.1%	5.9%	87.1%
	High	24	14	178
		11.1%	6.5%	82.4%
	Total	41	33	512
		7.0% ^d	5.6%	87.4%

†N-S is the Novaco-Sarason cohort described in Novaco, *et al.* (2).

^{a-e} Percentages with the same superscript differed significantly in between cohort comparisons (3, pp. 58-63).

Analysis Procedures. The data for the two cohorts were analyzed separately because:

- (a) Some different variables were measured for each cohort.
- (b) Separate analyses provide more extensive assessment of the stability of significant findings. The large sample sizes for the two cohorts produced this gain with minimal loss in statistical power for significance tests.
- (c) Interviews and discussions with training personnel indicated that it is commonly believed that recruit quality differs over the course of the calendar year. Support for this belief is provided by the fact that 6.8% fewer recruits in Cohort 1 received high school diplomas (see Table 1). Real or imagined quality differences could be important to several hypotheses to be tested.

The primary analysis procedures were loglinear analyses of multiway frequency tables and analyses of variance (see Appendix B for details). When feasible, analyses were carried out with split samples within a cohort to provide both within and between cohort replication of significant findings.

RESULTS AND DISCUSSION

Recruit Quality

Platoon attrition rate differences could arise because some platoons have better recruits than others. If this "recruit quality" hypothesis is correct, characteristics defining low quality recruits (e.g., past history of delinquent behavior, low intelligence, inability to adapt to discipline) will be more common in high attrition platoons at the beginning of BT. Our analyses to test this possibility examined the relationship between platoon attrition level and 19 measures of social background, 17 indicators of general ability (GCT plus 16 specific ASVAB scores) and 31 personality variables. Only one variable produced statistically significant differences.¹ Given 67 significance tests, at least one significant difference would be expected by chance. Overall, the findings certainly did not demonstrate quality differences large enough to explain the range of attrition rates.

Organizational Dynamics

Our evaluation of Novaco, et al.'s (2) organizational dynamics hypothesis involved two specific questions. First, do high attrition platoons selectively attrite particular types of recruits? Second, are stress levels and/or leadership different in high and low attrition platoons?

¹Powerful Other locus of control met the significance criterion (Sample A, $p < .04$; Sample B, $p < .10$). The high attrition group had the lowest average (Sample A, 4.02; Sample B, 4.00) and the medium attrition group had the highest average (Sample A, 4.19; Sample B, 4.21). The low attrition average was intermediate, but closer to the medium attrition group than the high attrition group (Sample A, 4.13; Sample B, 4.14). This finding is noted because it may be desirable to attempt to replicate the finding in the future. Also, the fact that it was this particular variable that produced significant differences leads to the speculation that additional research into attitudes toward discipline might be a useful direction for future studies.

Selective Attrition Selective attrition would be indicated if the increased probability of attrition in high attrition platoons were limited largely to specific attrition categories or to particular types of recruits. For example, the increased risk of attrition might be limited to recruits with below average intelligence or who lacked a high school diploma. The occurrence of this pattern of attrition was tested four ways:

Test 1: Novaco, et al. (2) found that the ratio of behavioral attrition to medical/erroneous enlistment attrition was highest in high attrition platoons. One interpretation of this trend is that high attrition platoons attrite more recruits whose attrition was at least partly discretionary. Novaco, et al.'s (2) original figures and our attempts to replicate their findings are shown in Table 4. The three cohorts of recruits produced three different orderings for the ratio, so the original Novaco, et al. (2) finding did not represent a trend that was consistent across samples.

TABLE 4
THE RATIO OF BEHAVIORAL DISCHARGES
TO MEDICAL/ERRONEOUS ENLISTMENT DISCHARGES
AS A FUNCTION OF PLATOON ATTRITION LEVEL

PLATOON ATTRITION LEVEL	NOVACO- SARASON COHORT	COHORT 1	COHORT 2
LOW	0.56	1.68	1.35
MEDIUM	1.20	0.90	1.13
HIGH	1.71	2.23	0.94

NOTE: See Table 3 (p.5) for discharge frequencies.

Test 2: If the decision to discharge a recruit was based on actual BT performance, high attrition platoons should perform better than low attrition platoons at the end of BT because these platoons would have eliminated more marginal performers. Combining our findings and those of Novaco, et al. (2), only Phase III oral examination scores (i) differed significantly as a function of platoon attrition level in at least two cohorts and (ii) had a similar pattern of average scores for all three cohorts (see Table 5,). Thus, (a) only 1 of 6 performance measures produced significant differences, and (b) the significant differences were small and did not support the selective attrition prediction that high attrition platoons will perform best.

TABLE 5
PERFORMANCE ON PHASE III ORAL EXAMINATION
AS A FUNCTION OF PLATOON ATTRITION LEVEL

		PLATOON ATTRITION LEVEL			SIGNIFICANCE LEVEL
SAMPLE		LOW	MEDIUM	HIGH	
COHORT 1	A	96.47	97.54	96.75	.017
	B	96.47	97.15	96.87	.213
COHORT 2	A	90.84	92.29	91.50	.014
	B	90.75	92.17	90.31	.390
N-S COHORT	--	96.41	96.77	95.10	.002

NOTE: See Appendix B for definition of samples.

Test 3: If high attrition platoons selectively had eliminated marginal individuals, the average high attrition platoon graduate should have more FMF success than the average low attrition graduate. This hypothesis could be true even though the two groups did not differ in BT performance if the personal attributes important to FMF success were different than those affecting BT academic performance or rifle marksmanship. Despite this possibility, graduates of high attrition platoons were no more successful in the FMF than those of low attrition platoons (see Table 6).

TABLE 6
FMF SUCCESS
AS A FUNCTION OF PLATOON ATTRITION LEVEL

	PLATOON ATTRITION LEVEL		
	LOW	MEDIUM	HIGH
COHORT 1			
Fast	223 (37.7%)	169 (36.2%)	183 (30.0%)
Regular	199 (33.7%)	162 (34.7%)	219 (35.8%)
Slow	62 (10.5%)	53 (11.3%)	93 (15.2%)
Behavioral Attrite	107 (18.1%)	83 (17.8%)	116 (18.9%)
$X^2 = 12.53, p < .052$			
COHORT 2			
Fast	177 (23.2%)	123 (23.4%)	117 (24.4%)
Regular	402 (52.7%)	285 (54.3%)	249 (51.9%)
Slow	118 (15.5%)	63 (12.0%)	65 (13.5%)
Behavioral Attrite	66 (8.7%)	54 (10.3%)	49 (10.2%)
$X^2 = 4.38, p < .026$			

NOTE: Groups were: Fast = Still in service, rank of E-4 or E-5; Regular = Still in service, rank of E-3; Slow = Still in service, rank of E-1 or E-2; Behavioral Attrite = Discharge for behavioral reasons following graduation from BT. Reservists were excluded from this analysis because they did not serve the full time in the FMF. Medical discharges and miscellaneous discharges were also excluded because these did not necessarily reflect poor performance.

Test 4: Drill Instructor decisions may have been based on expectations derived from the recruit's social background or personality rather than on actual performance. If so, high attrition platoons may selectively attrite recruits with particular social background characteristics (e.g., low intelligence, lack of a high school diploma). A series of analyses produced no evidence that the increased risk of attrition in high attrition platoons was linked to any recruit characteristic(s) (see Appendix B for details).

Stress and Leadership The second organizational dynamics hypothesis concerned stress and leadership differences between high and low attrition platoons. Given BT demands on recruits' abilities to learn new skills and behavior patterns, leadership and/or psychological stress may provide "the straw that breaks the camel's back" for some recruits (4-6). This possibility was tested in Cohort 1 using questionnaire scales developed in our prior research (7,8). Average scores for high and low attrition platoons did not differ significantly for any scale. Analyses were performed separately for two subsamples created by randomly dividing the original sample of 413 recruits. Only 2 of the 16 variables examined produced a significant difference in either of the subsamples. The closest either difference came to replicating was $p = 0.47$.

We also considered the possibility that stress was selectively applied to particular recruits. If so, recruit characteristics (e.g., social background, performance) should be significantly related to reported BT experiences in high attrition platoons, but not in low attrition platoons. Tests of this hypothesis showed that the association between recruit attributes and perceived stress and leadership was comparable at all platoon attrition levels.

Battalion Attrition Rates One other possible indication of organizational factors affecting attrition was Novaco, et al.'s (2) finding that there were attrition rate differences between recruit training battalions. To test this possibility, platoons were rank ordered for attrition rate and battalions were compared by the Kruskal-Wallis one-way analysis of variance for ranks (9). The battalion differences were not significant for either cohort (Cohort 1, $\chi^2 = 5.22$, $p < .10$; Cohort 2, $\chi^2 = 2.50$, $p > .25$).

CONCLUSIONS

Our replication of the initial Novaco, et al. (2) observation that platoon attrition rates vary widely confirms that this variation is a consistent phenomenon. However, we are no closer to understanding why these differences occur. Like Novaco, et al. (2), we found no substantial evidence of differences in recruit quality or performance between the recruits in low attrition platoons and those in high attrition platoons. In addition, we found no evidence of differences in organizational dynamics between low and high attrition platoons despite examining a wide range of possibilities.

The available information provides a starting place for subsequent study of the platoon attrition phenomenon. First, attempts could be made to identify aspects of recruit quality or organizational dynamics that might reasonably be thought to affect attrition, but have not been considered in the 3 available studies. Previously unmeasured attributes in either category may help understand platoon attrition differences.

A second extension would discard the assumption that recruit or organizational attributes operate in isolation from one another. For example, recruit quality may not depend on a single recruit attribute in isolation, but on the combination of one attribute with another that increases its effects on the recruit's behavior (10). The same principle can be applied to indicators of organizational dynamics or to combinations of recruit characteristics with organizational dynamics.

Revising the criterion variable is another possible extension of the platoon attrition level research. One possibility would be to consider only non-medical attrition. A second alternative would be to consider specific attrition categories (e.g., poor performance, misconduct). The impact of specific recruit qualities and/or organizational dynamics may be limited to certain types of attrition. Third, attention might shift from failure (i.e., attrition) to success (i.e., graduation). Platoon success rate would be the proportion of recruits beginning training with a platoon who graduated with that platoon. This rate is not simply 1 minus the attrition rate because recruits can be transferred from a platoon to physical conditioning platoons, to corrective custody, or sent to other platoons to repeat a part of the training cycle. These recruits may return to training and successfully complete BT, but they cannot be regarded as successful products of

their initial platoon. These examples illustrate that many alternative definitions of platoon attrition level or success level may be feasible and could be worth investigation to understand the dynamics of BT outcomes.

Because understanding the dynamics of BT attrition has a great deal of practical importance, additional investigation of the topics raised by differences in platoon attrition rates is probably worthwhile. Several potentially productive extensions of the initial work have been suggested which may help understand these dynamics. Overall, the most important possibilities involve identifying possible organizational determinants of BT attrition because these determinants are under control of the organization even when imposing strict selection controls to maintain high recruit quality is not feasible.

REFERENCES

1. Vickers, R.R., Jr. & Conway, T.L. The Marine Corps basic training experience: Psychosocial predictors of performance, health, and attrition. San Diego, CA: Naval Health Research Center, Technical Report 83-7, 1983.
2. Novaco, R., Sarason, I.G., Cook, T.M., Robinson, G.L. & Cunningham, F.J. Psychological and organizational factors related to attrition and performance in Marine Corps recruit training. Seattle, WA: Department of Psychology, University of Washington, Technical Report AR-001, November, 1979.
3. McNemar, Q. Psychological Statistics (Fourth Edition). N.Y: Wiley, 1969.
4. Bourne, P.G. Some observations on the psychosocial phenomena seen in basic training. Psychiatry, 1967, 30, 187-196.
5. Maskin, M.H. & Altman, L.L. Military psychodynamics: Psychological factors in the transition from civilian to soldier. Psychiatry, 1943, 6, 263-269.
6. Zurcher, L.A., Jr. The naval recruit training center: A study of role assimilation in a total institution. Sociological Inquiry, 1968, 31, 85-98.
7. Vickers, R.R., Jr. & Ryman, D.H. Development of a questionnaire to measure psychological stress and related concepts in the context of the Marine Corps basic training setting. San Diego, CA: Naval Health Research Center, Technical Report 80-12, 1980.
8. Wallick, M.T., Vickers, R.R., Jr. & Ryman, D.H. Revision of a questionnaire to measure stress and related aspects of basic training. San Diego, CA: Naval Health Research Center, Technical Report 82-19, 1982.

9. Siegel, S. Nonparametric Statistics. N.Y.: McGraw-Hill, 1956, 229-238.
10. Robinson, G.L., Novaco, R.W. & Sarason, I.W. Cognitive correlates of outcome and performance in Marine Corps recruit training. Seattle, WA: Department of Psychology, University of Washington, Technical Report AR-005, 1981.
11. Plag, J.A. Pre-enlistment variables related to the performance and adjustment of Navy recruits. Journal of Clinical Psychology, 1962, 18, 168-171.
12. LaRocco, J.M., Ryman, D.H. & Biersner, R.J. Life history and mood as predictors of adjustment in Navy recruit training. Journal of Community Psychology, 1977, 5, 46-51.
13. Joffe, P. & Naditch, M.P. Paper and pencil measures of coping and defense processes. In N. Haan (ed.), Coping and Defending: Processes of Self-Environment Organization. New York: Academic Press, 1977.
14. Levenson, H. Reliability and validity of the I, P, and C scales--A multidimensional view of locus of control. Paper presented at the Annual Convention of the American Psychological Association, Montreal, August, 1973.
15. Levenson, H. Perceived parental antecedents of internal, powerful others, and chance locus of control orientations. Developmental Psychology, 1973, 9, 268-274.
16. Levenson, H. Activism and powerful others: Distinctions within the concept of internal-external control. Journal of Personality Assessment, 1974, 38, 377-383.
17. Levenson, H. Additional dimensions of internal-external control. The Journal of Social Psychology, 1975, 97, 303-304.
18. Hackman, J.R. & Oldham, G.R. The Job Diagnostic Survey: An instrument for the diagnosis of jobs and the evaluation of job redesign projects. New Haven, CN: School of Organization and Management, Yale University, Technical Report 4, 1974.
19. Youngblood, S.A., Laughlin, J.E., Mobley, W.H. & Meglino, B.M. A longitudinal analysis of military recruit attrition: The first 25 months. Columbia, SC: College of Business Administration, Center for Management and Organizational Research, University of South Carolina, Technical Report 11, 1980.
20. Booth, R.F. & Holberg, A. Structure and measurement of Marine recruit attitudes. Journal of Applied Psychology, 1974, 59, 236-238.
21. Drucker, E.H. A longitudinal study of attitude change and alienation during basic combat training. Washington, D.C.: Human Resources Research Organization, Technical Report 74-15, June 1974.
22. Quinn, R.P. & Shepard, L.J. 1972-1973 quality of employment survey: Descriptive statistics with comparison data from the 1969-1970 survey of working conditions. Ann Arbor, MI: Institute for Social Research, University of Michigan, 1974.
23. Vickers, R. R. Jr., Wallick, M.T. & Hervig, L.K. The Marine Corps basic training experience: Stresses, leadership, and group cohesion as predictors of performance, health, and attrition. San Diego, CA: Naval Health Research Center, Technical Report 82-28, 1982.

24. Winer, B.J. Statistical Principles in Experimental Design. N.Y.: McGraw-Hill, 1962.
25. Bryson, K.R. & Phillips, D.P. Method for classifying interval-scale and ordinal-scale data. In Heise, D.R. (ed.) Sociological Methodology 1975, San Francisco: Jossey-Bass, Inc. 1974, 171-190.
26. Brown, M.B. Screening effects in multidimensional contingency tables. Applied Statistics, 1976, 25, 37-46.
27. Payne, C. The log-linear model for contingency tables. In C.A. O'Muircheartaigh and C. Payne (eds.), The Analysis of Survey Data. Volume 2: Model Fitting. N.Y.: Wiley, 1977, 105-144.
28. Feller, W. An Introduction to Probability Theory and Its Applications. Volume I (Third Edition). N.Y.: Wiley, 1968, 146-152.
29. Dunn, O.J. Multiple comparisons among means. Journal of the American Statistical Association, 1961, 56, 52-64.

APPENDIX A

DEFINITION OF VARIABLES

APPENDIX A
DEFINITIONS OF VARIABLES

Measures of Recruit Social and Demographic Characteristics.

Age, race, education, and marital status were determined from Marine Corps records in Cohort 1. The same four variables plus fifteen measures of social behavior were obtained in Cohort 2 by a self-report questionnaire completed prior to basic training (1). The specific social behaviors measured, selected on the basis of prior work by Plag (11) and LaRocco, Ryman, and Biersner (12), are indicated in Table A-1.

TABLE A-1
SOCIAL BACKGROUND CHARACTERISTICS

MEASURE	CATEGORY
<i>A. DEMOGRAPHIC</i>	
1. Age	17, 18, 19, 20+ years
2. Marital Status	Single, Other
3. Racial Group	Caucasian, Other
4. Size of Home Town	Farm, Town, City, Large city
5. Parents' Marital Status	Married and living together, Other
<i>B. EDUCATION</i>	
1. High School Diploma	No, GED, Yes
2. Years Education	9-11, 12+
3. School Year Repeated	No, Yes
4. Average Grades	Below average, Average, Above average
<i>C. TRUANCY</i>	
1. Runaway	Never, 1 or more times
2. Hooky	Never, 1-3 times, 4 or more times
3. Expelled from School	Never, Once, 2 or more times
4. Trouble with police	Never, Once, 2 or more times
<i>D. SOCIAL ACTIVITIES</i>	
1. Work during School Year	0-10 hr/wk, 11-30 hr/wk, 31+ hr/wk
2. Work during Summer	0-20 hr/wk, 21 or more hr/wk
3. School Activities	Rarely, Once-some, Often-frequently ^a
4. Other Activities	Rarely, Once-some, Often-frequently ^a
5. Official Athletics	Rarely, Once-some-often, Frequently ^a
6. Unofficial Athletics	Rarely-once, Some-often, Frequently ^a

^aCategories for these variables indicate specific response alternatives that were combined to form groups for the loglinear analyses (see Appendix

Personality Measures.

The personality scales administered in the Cohort 2 study are listed and defined in Table A-2. Each scale was included because it had previously been shown to be associated with BT attrition (1). Details regarding the measures and their selection are given in an earlier report (1).

Table A-2

OPERATIONAL DEFINITIONS: RECRUIT PERSONALITY CHARACTERISTICS

Coping Processes^a

Objectivity: Separates ideas and feelings as required by the situations. Can be consciously of two minds.

Intellectuality: Can detach self from affect-laden situations to give impartial analysis, but still articulates and symbolizes feelings so they contribute to decisions and behavior.

Logical Analysis: Systematically analyzes causal aspects of situations, including motivational explanations.

Tolerance of Ambiguity: Can make qualified judgments and deal with cognitive and affective complexity and uncertainty.

Empathy: Puts self in the other person's shoes and can imagine how they feel; takes others' feelings into account in making decisions.

Regression in Service of the Ego: Utilizes feelings and ideas that are not part of the practical requirements of the situation to give better insight into problems and situation.

Concentration: Sets aside disturbing or attractive feelings or thoughts to concentrate on task at hand.

Sublimation: Finds self-satisfying, socially acceptable means of expressing "primitive" affect

Substitution: Expresses tempered, domesticated feelings that are appropriate, flexible, metered, and purposive.

Suppression: Infeasible, inappropriate affect and feelings are controlled until time, place, and object are proper for expression.

Defensive Processes^a

Isolation: Affect is not related to ideas, or seems unable to put ideas together. Unable to generalize, synthesize, or integrate meaningfully.

Intellectualization: Retreats from affect into formulations of words and abstraction at a level inappropriate to the setting.

Rationalization: Offers superficially plausible reasons for behavior that omit crucial aspects of situation; needs to offer causal explanations, e.g., "It's fate."

Table A-2

OPERATIONAL DEFINITIONS: RECRUIT PERSONALITY CHARACTERISTICS

(Continued)

Doubt: Unable to resolve ambiguity or choose a course of action; hopes problems will solve themselves; worries about past decisions and behavior.

Projection: Attributes objectionable tendency of self to another and does not recognize it as part of self.

Regression: Resorts to evasive, wistful, demanding, dependent, ingratiating, behavior that is not age-appropriate to avoid responsibility, aggression, or unpleasant demands.

Denial: Denies present or past facts or feelings that would be painful to focus on benign or pleasant ones.

Displacement: Tries to control affects or impulses in relation to original object, then expressed them inappropriately in a more tolerant situation.

Reaction Formation: Appears to have transformed "primitive" impulses and feelings into opposites, but expression of both is excessively civilized, and sometimes breaks down.

Repression: Unconsciously and purposefully forgets, and is unable to remember past, or cannot elaborate.

Levenson's Locus of Control Scales^b

Internal Control: Believes that what happens to him or her in life in general and in specific situations such as making friends, driving a car, or achieving leadership positions, depends on his or her own actions or personal attributes.

Powerful Other Control: Believes that what happens in the situations described above is determined by the actions of other people who have the power to determine his or her fate.

Chance Control: Believes that what happens in the situations described above is due to fate, chance, circumstances, etc.

Job Diagnostic Survey Scales^c

Skill Variety: Perceives job as requiring a variety of different activities to carry out the work; sees job as requiring a number of different skills and abilities.

Task Identity: Perceives the job as requiring the completion of a whole, identifiable piece of work, i.e., doing a job with a visible outcome from beginning to end.

Task Significance: Perceives the job as having a substantial impact on the lives or work of others either in his immediate organization or in the external environment.

Autonomy: Perceives the job as providing substantial freedom, independence, and discretion to the employee with respect to scheduling work and determining procedures to be used to carry out these plans

Table A-2

OPERATIONAL DEFINITIONS: RECRUIT PERSONALITY CHARACTERISTICS

(Continued)

Feedback from the Job: Perceives the activities of the job as providing direct, clear information about the effectiveness or adequacy of his or her performance

Feedback from Agents: Perceives the job as one in which the employee receives clear feedback about performance from supervisors or from co-workers.

Dealing with Others: Perceives the job as requiring the employee to work closely with other people to complete work activities

Enlistment Expectations: Subjective assessment of the probability that he will successfully complete his tour of duty and/or reenlist.

^aScales in this category were taken from Joffe and Naditch (13).

^bScales in this category were taken from Levenson (14-17).

^cScales in this category were taken from Hackman and Oldham (18), except for "Enlistment Expectations" which is an adaptation from Youngblood, Laughlin, Mobley, and Meglino (19).

Perceptions of Training

A random sample of 425 Cohort 1 recruits completed a paper-and-pencil instrument measuring perceived BT stresses, leadership, and group cohesion. The scales in this instrument had been developed specifically to reflect recruit perceptions of BT (7,8; see Table A-3 for a list of the scales and definitions). Each scale consisted of several items describing a particular aspect of BT stress, leadership style, or group cohesion. Recruits indicated strength of agreement with the statement or the frequency with which the condition described by the statement occurred during BT. Agreement was indicated by responses ranging from 1 (Disagree Strongly) to 7 (Agree Strongly). Frequency of occurrence was indicated by responses ranging from 1 (Never) to 7 (Always). Two response scales were used to provide a more meaningful response language for some questions which could best be answered in terms of frequency. Because the scales reflect recruits' reports of their experiences, the qualification "as perceived by recruits" applies to any description of BT based on these scales. These scales were administered to recruits the day prior to graduation. Scale scores therefore represent an overall retrospective evaluation of BT.

Table A-3

OPERATIONAL DEFINITIONS: RECRUIT PERCEPTIONS OF BASIC TRAINING

Positive Basic Training Stresses

Effort Requirements: Perceiving basic training as requiring both skill and effort to succeed.

Example Items: (a) Training required skill and effort to do well.
(b) Training was very physically demanding.

Ability Requirements: Perceiving basic training as requiring the use of one's skills and abilities and/or as developing skills and abilities.

Example Items: (a) Training was dull and boring.
(b) There was a chance to show your best abilities.

Performance Goals: Emphasis by Drill Instructors on not merely meeting basic performance requirements, but consistently exceeding these requirements to achieve the highest possible level of performance.

Example Items: (a) Drill Instructors insisted on high standards of performance.
(b) The Drill Instructors wanted you to do more than just pass an exam or prac.

Rules Emphasis: An emphasis on closely following rules and regulations and receiving punishment for even minor infractions; placing more importance on following the rules than on simply getting the job done.

Example Items: (a) There was a strict emphasis on following rules and regulations.
(b) Even minor rules and regulations were very strictly enforced.

Purpose: The extent to which recruits felt there were good reasons for the amount and type of stress they encountered in basic training.

Example items: (a) Boot camp determines which recruits will not stand up to combat.
(b) The reason for Drill Instructors toughness and harshness was to develop mental and physical conditioning in recruits.

Negative Basic Training Stresses

Overload: The extent to which there was more work to be done than could be accomplished in the time available; pressure and hurrying to get things done.

Example items: (a) There were tight time schedules with pressure to get things done on time.
(b) It was impossible to complete a job in the time given.

Role Ambiguity: Not knowing clearly what behaviors were expected; being uncertain of what to do, how to do it, or why it had to be done.

Example items: (a) Orders and explanationss were clear about what had to be done. (Reverse scored)
(b) Rules and decisions were clearly explained. (Reverse scored)

Table A-3

OPERATIONAL DEFINITIONS: RECRUIT PERCEPTIONS OF BASIC TRAINING

(continued)

Role Conflict: Receiving different, mutually exclusive orders with regard to tasks, goals, or procedures; being pressured by other recruits to do things differently than the Drill Instructors wanted.

Example items: (a) I received conflicting orders about what to do from different Drill Instructors.
(b) I had to do things in a way that was acceptable to one Drill Instructor, but not another.

Punishment Behavior: The extent to which Drill Instructors quickly and consistently punished poor performance.

Example Items: (a) Drill Instructors criticized poor work.
(b) Drill Instructors used threats and fear to motivate us.

Loss of Autonomy: The extent to which discipline was extended to areas the recruit felt were not appropriate; loss of a feeling of personal control over one's life and/or loss of recognition as a person.

Example Items: (a) Recruits were treated like children.
(b) I was treated as an individual. (Reverse scored)

Leadership and Group Cohesion Variables

Leader Structuring: The extent to which Drill Instructors provided means-end structuring in the form of detailing who was to do what and when.

Example Items: (a) Our Drill Instructors told us exactly how to do things.
(b) Drill Instructors told us why things had to be done.

Leader Support: The extent to which Drill Instructors communicate a concern for the well-being of the recruits and a respect for the platoon.

Example Items: (a) The Drill Instructors were interested in our welfare.
(b) The Drill Instructors were proud of the platoon and the recruits in it.

Referent Power: The extent to which Drill Instructors are regarded as setting a good example which the recruits want to copy.

Example Items: (a) I would like to be like my Drill Instructors.
(b) I respect my Drill Instructors as people.

Expert Power: The extent to which Drill Instructors were expert and knowledgeable in their job.

Example Items: (a) My Drill Instructors are well-qualified for their jobs.
(b) My Drill Instructors are very good at what they do.

Table A-3

OPERATIONAL DEFINITIONS: RECRUIT PERCEPTIONS OF BASIC TRAINING
(continued)

Group Teamwork: The extent to which recruits cooperated with one another and worked as a team to get necessary tasks done.

Example Items: (a) In our platoon people cooperated to get things done.
(b) Recruits stressed teamwork and team goals.

Group Support: The extent to which recruits in the platoon tried to make one another feel better when things were going bad and/or provided actual assistance on tasks that did not necessarily require teamwork.

Example Items: (a) Recruits in the platoon trust one another.
(b) Recruits in the platoon lent each other a hand when things got rough.

Training Performance.

The following performance measures were obtained from training records:

(a) Practical examinations. Examinations covering academic subjects were taken at the end of the first two weeks of BT and during the last two weeks. The first test provided one overall score while the second yielded separate oral and written scores. Maximum possible scores were 100 points for the first test and 50 points for each subtest at the end of BT.

(b) Physical fitness. Fitness tests were comprised of number of pull-ups, number of sit-ups, and time for a 3-mile run. These tests were administered at approximately the same time as the academic tests. The maximum possible score was 300 points.

(c) Rifle marksmanship. Scores obtained when firing the M-16 rifle for qualification assessed rifle marksmanship skill. At the time of these studies, qualification took place at the end of the fifth week of BT. The maximum possible score was 250 points.

(d) Drill Instructor ratings. Ratings were made by Drill Instructors at the end of BT. Conduct ratings indicate the extent of the recruit's adherence to both the letter and spirit of regulations during training. Senior Drill Instructor Subjective Evaluation (SDISE) is an appraisal of the recruit's initiative and skills in the performance of routine duties and non-routine tasks during training. These ratings are made on a 5-point scale.

Aptitude Scores

Aptitude scores from the Armed Services Vocational Aptitude Battery (ASVAB) and the General Classifications Test (GCT) score were obtained from Marine Corps records.

APPENDIX B

ANALYSIS PROCEDURES

APPENDIX B

ANALYSIS PROCEDURES

The primary analysis procedures were analysis of variance (ANOVA) and loglinear analysis of multiway frequency tables. For these analyses, the sample in each cohort was split into prediction and replication subsamples. A 50%-50% split was used in Cohort 1. One subsample was randomly designated Sample A and the other as Sample B. A 70%-30% split was used in Cohort 2 to parallel procedures used earlier when evaluating the relationship between recruit characteristics and BT attrition (1). The 70% subsample was designated Sample A and the 30% subsample was Sample B.

In the analyses for each cohort, initial analyses were performed first in Subsample A and then replicated in Subsample B. Significance tests were two-tailed for Subsample A, but one-tailed for Subsample B analyses because the direction of associations had already been established. Replicating results within studies ensured that the chance assignment of a few extreme cases to one of the analysis groups was not a major factor in the findings.

Analysis of Variance Procedures A one-way ANOVA comparing low, medium, and high platoon attrition level groups was the primary ANOVA procedure (24). This analysis determined the simple relationships between attrition level and personality and performance variables.

Additional two-way ANOVAs tested hypotheses concerning selective attrition. Group classifications for these analyses were based on platoon attrition level and BT attrition category (BT graduate, behavioral attrite, and medical attrite). If the selective attrition hypothesis were correct, the two-way ANOVAs should show significant interactions between platoon attrition level and attrition category.

The reasoning was that selective attrition would mean that high attrition platoons were attriting more recruits who were only slightly below average than were low attrition platoons. If so, the mean score for negative personality variables would have been higher among attrites in the high attrition platoons. The reverse would be true for the low attrition platoons. Furthermore, both trends would have been most pronounced in the behavioral attrite category because this group presumably included more discretionary attrition than the medical attrition group and therefore provided the main opportunity for expression of any selection biases.

A second series of two-way ANOVAs tested the hypothesis that marginal individuals were treated differently than others. The group membership for these analyses was defined by the combination of platoon attrition level and either a recruit social characteristic or personality characteristic. The levels for social characteristics were given in Table A-1 (p.A-2). Each personality variable was divided into low, medium and high levels by examining the distribution of observed scores and setting cutoff points which minimized the loss of variance due to grouping (25). For these analyses, the hypothesis predicted a significant interaction in the form of higher stress or lower leadership ratings in the group defined by the combination of high platoon attrition and either a negative social characteristic (e.g., no high school diploma) or a maladaptive personality characteristic (e.g., external locus of control).

Loglinear Analysis Procedures. Loglinear analyses were employed to analyze 2- and 3-way cross-classifications of recruits based on demographic characteristics (26). Two-way classifications (e.g., high school diploma by platoon attrition level) were employed to determine whether the typical demographic and social characteristics of recruits in low, medium, and high attrition platoons differed. The 3-way classifications tested the selective attrition hypothesis. Classification for these analyses was based on platoon attrition level, ET attrition status (i.e., ET graduate, behavioral attrite, medical attrite), and a social or demographic characteristic (e.g., high school diploma vs. no diploma).

According to the selective attrition hypothesis, the increased risk of attrition associated with being a member of a high attrition platoon would be confined to certain categories of recruits (e.g., non-high school graduates). Because medical attrition varies only slightly with platoon attrition level (see Table 3, p. 5), this trend should be confined primarily to the behavioral attrition category. Under these conditions, the loglinear analysis should produce a significant 3-way interaction (26). The likelihood ratio test (27) was employed to test for the presence of such interactions.

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results were replicated and high and low platoons did not differ with respect to leadership or stress. These results confirm that substantial variation in platoon attrition levels is a consistent phenomenon in recruit training, but these differences cannot be explained by either recruit characteristics or organizational characteristics investigated to date.

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